greatest amount of flexor and extensor tendon travel through the carpal tunnel, which can initiate or aggravate carpal tunnel syndrome.

[0039] 4. Joint Position

[0040] Joints, muscles and tendons experience stress and fatigue when held in unnatural positions for extended periods of time. Chris Grant, Ph.D., of F-One Ergonomics in Ann Arbor, Mich., attributes many stress problems to "non-neutral" joint postures. As a solution, Dr. Grant has found it best to keep wrist and finger joints positioned near the center of travel. (See REF7 at page 2).

[0041] According to Dr. Johnson, using desktop devices such as mice and trackballs encourage undesirable wrist extension. (See REF4 at page 2) This unnatural stretch puts harmful stress on joints, tendons and the sensitive carpal tunnel. Further compounding the problem, most mice keep fingers extended well beyond their neutral position. In general, any repeated, awkward reaching or bending will cause problems in the body. Additionally, Professor Hedge emphasizes the need to keep the elbow at a right angle or straighter to prevent compressing the nerves near the joint-.(See REF6 at page 3). Unfortunately, most pointing devices are desktop-operated and often keep the elbow at a less desirable, acute angle.

[0042] 5. Small Exertions

[0043] Dr. Grant has found that sudden, little exertions can damage small muscles and tendons and should be avoided or minimized. (See REF7 at page 2). Even the repeated force of clicking or holding mouse buttons should not be ignored. With today's graphical, mouse-oriented computing environment, injuries from excessive clicking and dragging operations have become a serious problem. To reduce soreness in fingers and tendons, Dr. Johnson recommends using a mouse that requires the least amount of activation force to click and hold the buttons. (See REF4 at page 2).

[0044] 6. Muscle Tension

[0045] Constant muscle tension in the hands, arms and shoulders is another serious contributing factor. Dr. Hedge and Dr. Grant stress the benefits of keeping limbs and shoulders as relaxed and loose as possible. (See REF6 at page 3 and REF7 at page 2). The design of many mice and trackballs encourages gripping the device to better control the cursor. For this reason, Dr. Johnson urges users to let go of the device when not navigating. (See REF6 at page 5) Any pointing device should be held lightly when in use. Ideally, the experts agree, the hand should be in a neutral, relaxed position as much as possible between and during input actions.

[0046] 7. Body Posture

[0047] Good posture is the basis of ergonomic computer use, according to Professor Hedge. (See REF6 at page 3) A good sitting posture is not stiff, but balanced and relaxed. Good posture minimizes prolonged stresses in the body, especially where skeletal support muscles are involved. In practice, however, many mice and trackballs are situated to encourage the user to slump or lean forward when reaching for them.

[0048] 8. Localized Pressure

[0049] Dr. Grant stresses the importance of minimizing pressures localized to small parts of the body. He especially urges users not to support their wrists or elbows on edges or smaller surfaces. He advises against trying to offset the drawbacks of desktop pointing devices by using wrist rests. (See REF7 at pages 2 and 4) Wrist rests tend to apply pressure to the soft underside of the wrist compressing nerves together with moving tendons. Such a situation can easily compound repetitive stress problems.

[0050] Ergonomic Problem Summary

[0051] In summary, computer ergonomics experts agree that mouse-user interaction needs to be improved to reduce the stresses and irritation associated with repetitive-motion injuries. A more relaxed and natural hand and wrist position, minimal motion to the arm, wrist and fingers, and minimal button activation (or "clicking") pressure are essential properties of a truly ergonomic pointing device. Reaching should be eliminated altogether. Shoulder and arm stresses can be reduced by using a stationary pointing device that is centrally located close to the body. A lower, centralized location encourages the most beneficial body posture and reduces elbow bend and related nerve pinching. Ideally, users would sit and work with their hands relaxed and partially open in the lap.

SUMMARY OF THE DISCLOSURE

[0052] It is, therefore, an object of this invention to provide a pointing device that is easier and more comfortable to use than existing pointing devices. It is another object of this invention to provide a pointing device that will minimize any fatigue experienced by the user.

[0053] It is an object of this invention to eliminate the need for repetitive arm movements to move the pointing device in order to control the x-y position of a position icon on a computer display.

[0054] It is an object of this invention to allow the user to place the pointing device in a comfortable convenient location including a location with the wrist straight, arm close to the body, and preferably with the hand resting easily in the user's lap.

[0055] It is an object of this invention to provide a pointing device that does not overwork the small muscles and the flexor and extensor tendons of the fingers such as occurs in the kicking motion to rotate a trackball to move the position icon a large amount on the display screen.

[0056] It is an object of this invention to avoid the imposition of stress and fatigue on joint muscles and tendons attributed to maintaining "non-neutral" joint positions.

[0057] It is an object of this invention to use actuators in the pointing device that require less activation force to "click" or hold than the activators found in prior art mouse devices.

[0058] It is an object of this invention to develop a pointing device that can be used by users with a variety of hand sizes.

[0059] It is an object of this invention to develop means for adjusting the pointing device to increase the range of hand sizes that can comfortably use a particular size of the pointing device.